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Comptroller General of the United States

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The Environmental Protection Agency (EPA) conducts the major Federal water pollution control research program. Because of the large amount of funds appropriated, the General Accounting Office (GAO) examined into EPA's administration of its demonstration grant program and its research grants and contracts, utilization of its laboratory facilities, and management of its research equipment.

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REPORT TO THE CONGRESS

Need To Improve Administration Of The Water Pollution Research, Development, And Demonstration Program

Environmental Protection Agency

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-166506

To the President of the Senate and the
Speaker of the House of Representatives

This is our report on the need to improve the Environmental Protection Agency's administration of the water pollution research, development, and demonstration program.

Our review was made pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

Copies of this report are being sent to the Director, Office of Management and Budget; the Chairman, Council on Environmental Quality; and the Administrator, Environmental Protection Agency.

Elmer B. Staats

Comptroller General
of the United States

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ABBREVIATIONS

EPA	Environmental Protection Agency
GAO	General Accounting Office

COMPTROLLER GENERAL'S REPORT TO THE CONGRESS

NEED TO IMPROVE ADMINISTRATION OF THE WATER POLLUTION RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROGRAM

Environmental Protection Agency
B-166506

D I G E S T

WHY THE REVIEW WAS MADE

The Environmental Protection Agency (EPA) conducts the major Federal water pollution control research program. EPA conducts in-house research at eight laboratories and awards grants and contracts to public and private agencies, institutions, and individuals for research, development, and demonstration projects. For fiscal years 1956 through 1972, the Congress appropriated $350 million for the water pollution control research program of EPA and its predecessor agencies. Because of the large amount of funds appropriated, the General Accounting Office (GAO) examined into EPA's administration of its demonstration grant program and its research grants and contracts, utilization of its laboratory facilities, and management of its research equipment.

FINDINGS AND CONCLUSIONS

Demonstration grants

The Federal Water Pollution Control Act, as amended (33 U.S.C. 1151), authorizes grants for demonstrating new or improved methods of controlling water pollution, including methods of treating industrial wastes which have industrywide application. From the beginning of the demonstration grant program in fiscal year 1966 through fiscal year 1972, the Congress appropriated about $126 million for demonstration of new or improved methods of controlling water pollution. EPA's efforts have contributed to the solution of problems relating to the causes, control, and prevention of water pollution. Some projects have demonstrated new treatment methods, and others show promise for improving conventional waste treatment practices. Many grants, however, were awarded for the construction and operation of full-scale conventional waste treatment projects which did not demonstrate new or improved waste treatment processes. EPA officials told GAO that in funding such projects they were extending the use of conventional technology to new applications.

EPA had not provided adequate guidance to its personnel charged with reviewing and evaluating grant applications on what features or characteristics of a proposal should or should not be considered "new or improved." (See pp. 10 to 13.) In addition, EPA had not established specific criteria or guidelines for determining the extent to which the Federal Government should share the cost of constructing, operating, and maintaining full-scale demonstration plants for which only a part of the costs were related to demonstrating new or improved water pollution control methods. (See pp. 15 to 17.)

The Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500) enacted on October 18, 1972. continue to authorize grants for projects demonstrating new or improved methods of waste treatment. The new law also sets as a national objective the elimination of pollution from the Nation's waters. The report on the Senate bill emphasized the need for an extensive program of demonstration projects to rapidly expand the technology available to meet the national objective.

In view of (1) the need for developing and demonstrating treatment technology for preventing and controlling water pollution and (2) the intent of recently enacted legislation, EPA should place greater emphasis on funding projects that demonstrate new or improved methods of waste treatment.

Administration of research grants and contracts

As of June 30, 1971, EPA had about 900 active research grant and contract projects (extramural research). GAO's review of 104 projects showed that, in many cases:

--Approval of applications had been delayed for both new projects and extensions for ongoing projects. (See pp. 21 to 23.)

--Monitoring of ongoing research projects had been inadequate. (See pp. 24 to 25.)

--Grantees had not submitted project reports on a timely basis and EPA had not promptly disseminated them to potential users. (See pp. 26 to 30.)

During GAO's review, EPA made a number of changes in its regulations and procedures which, if properly implemented, should improve the administration of its extramural research program. Further changes are desirable; accordingly, GAO is making several recommendations for improvement. (See p. 31.)

Laboratory facilities and equipment

EPA had not fully used its laboratories for in-house research because they had not been fully staffed and because the research staff spent considerable time on duties other than in-house research. From fiscal year 1968 until December 1971, staffing levels remained relatively constant due to Government-wide personnel limitations. As of December 1971 three laboratories were staffed at 64 percent of the capacity for which they were designed. Although the primary duties of laboratory researchers were to perform in-house research and to provide technical assistance to other EPA personnel, State and local water pollution control agencies, and industrial personnel, many researchers spent considerable time administering the extramural research grant and contract programs.

The researchers' time spent administering the extramural program varied between laboratories and between individuals--from 6 percent at one laboratory to 41 percent at another. Overall, it was considerable. EPA sources have said that EPA's in-house research is highly productive and effective and is the foundation of EPA's overall research program. Thus, there is a need for EPA to place greater emphasis on having laboratory researchers spend more time on their primary functions. (See pp. 32 to 35.)

There were no formal procedures at the laboratories for identifying little-used or excess equipment. Usage records were not maintained and equipment pools had not been established. An inspection by GAO and EPA officials at four laboratories identified equipment that was excess to the laboratories' needs or underused and thus available for pooling or sharing. (See pp. 36 to 38.)

RECOMMENDATIONS OR SUGGESTIONS

The Administrator, EPA, should:

--Place greater emphasis on funding projects that demonstrate new or improved methods of waste treatment.

--Provide more specific guidance on the factors that should be considered in determining whether a proposed treatment process is new or improved and has industrywide application.

--Establish specific criteria for determining the Federal Government's share of the cost of constructing full-scale projects for which only a part of the costs relate to demonstrating new or improved water pollution control technology.

--Insure that all project officers are adequately trained to administer the extramural grants and contracts programs.

--Require project officers to promptly contact grantees and contractors to urge them to submit progress reports and final reports on a timely basis.

--Withhold financial support for new projects from applicants who, without justification, have not submitted the required final reports on completed research projects for which the applicants previously received EPA financial support.

--Require that a study be made at the EPA laboratories not included in GAO's review to identify equipment that may be underused or excess to the laboratories' needs.

--Establish formal procedures requiring (1) systematic identification of excess and underused laboratory equipment and (2) more pooling or sharing of equipment.

AGENCY ACTIONS AND UNRESOLVED ISSUES

EPA generally agreed with GAO's findings. EPA said that its guidelines for review of applications for demonstration projects and its criteria for determining the extent of Federal participation in the construction and operation of the projects would place greater emphasis on demonstrating new methods of waste treatment that surpass the conventional systems.

EPA said that it would implement GAO's recommendations for a study of equipment use at EPA's laboratories and for the development of formal procedures for identifying and pooling underused or excess laboratory equipment. EPA said also that it would review and, if possible, refocus its use of research staff when present staffing constraints are changed.

MATTERS FOR CONSIDERATION BY THE CONGRESS

This report is part of a continuing effort by GAO to keep the Congress informed of the administration of Federal programs for improving the environment.

Public Law 92-500, enacted on October 18, 1972, requires GAO to:

> "*** conduct a study and review of the research, pilot and demonstration programs related to prevention and control of water pollution, including waste treatment and disposal techniques, which are conducted, supported, or assisted by any agency of the Federal Government pursuant to any Federal law or regulation ***."

In accordance with this requirement, GAO has initiated a comprehensive review of EPA's and other Federal agencies' research, development, and demonstration programs related to the control and prevention of water pollution.

CHAPTER 1

INTRODUCTION

The Environmental Protection Agency (EPA) conducts the major Federal water pollution control research program. Research is directed primarily toward the sources and effects of water pollution and the techniques of water pollution control. EPA conducts in-house research at eight laboratories and awards grants and contracts to public and private agencies, institutions, and individuals for research, development, and demonstration projects. For fiscal years 1956 through 1972, the Congress appropriated about $350 million for the water pollution control research program of EPA and its predecessor agencies.

Our review of the research program covered the period 1956 through June 30, 1971, and was directed primarily toward evaluating EPA's policies, procedures, and practices related to (1) the implementation of its demonstration grant program, (2) the administration of its research grants and contracts, (3) the utilization of its laboratory facilities, and (4) the management of its research equipment.

We reviewed pertinent legislation, documents, reports, and files; held discussions with EPA officials; and visited selected project sites. We conducted our review at EPA headquarters in Washington, D.C.; at EPA regional offices in Portland, Oregon, and Chicago, Illinois; and at the following EPA laboratories.

Laboratory	Location
Pacific Northwest Water Laboratory	Corvallis, Oregon
Alaska Water Laboratory	College, Alaska
National Water Quality Laboratory	Duluth, Minnesota
Robert A. Taft Water Research Center	Cincinnati, Ohio

LEGISLATION

The Federal Water Pollution Control Act of 1956, as amended (33 U.S.C. 1151), provides that:

"The Secretary [now the Administrator, EPA] shall establish, equip, and maintain field laboratory and research facilities, including, but not limited to, one to be located in the northeastern area of the United States, one in the Middle Atlantic area, one in the southeastern area, one in the midwestern area, one in the southwestern area, one in the Pacific Northwest, and one in the State of Alaska, for the conduct of research, investigations, experiments, field demonstrations and studies, and training relating to the prevention and control of water pollution. Insofar as practicable, each such facility shall be located near institutions of higher learning in which graduate training in such research might be carried out."

The bulk of EPA's research grant and contract authority is contained in sections 5 and 6 of the Federal Water Pollution Control Act of 1956, as amended. Under section 5 EPA is authorized to award grants and contracts for research and demonstration projects to public or private agencies, institutions, and individuals. EPA has interpreted section 5 as authorizing grants and contracts for projects directed toward the discovery and development of new information and technology in chemical, physical, biological, social science, and engineering fields. EPA has awarded grants and contracts for research related to

--the identification of pollutants,
--the fate and persistence of pollutants,
--the effects of pollutants on water uses,
--treatment processes,
--nontreatment methods of pollution control, and
--the ultimate disposal of pollutants.

Section 6(a) of the act authorizes EPA to award grants for the demonstration of (1) new or improved methods of controlling discharges from sewers carrying storm water and/or sewage or other waste and (2) advanced waste treatment and water purification methods or new or improved methods of joint treatment for municipal and industrial wastes. Section 6(b) authorizes grants for research and demonstration

projects related to preventing industrial water pollution, including but not limited to treatment of industrial waste.

WATER POLLUTION RESEARCH PROGRAM

Prior to May 1966 the Department of Health, Education, and Welfare (HEW) had responsibility for the Federal water pollution control program. In May 1966 the Federal Water Pollution Control Administration was transferred from HEW to the Department of the Interior and in April 1970 was renamed the Federal Water Quality Administration. In December 1970 the functions of the Federal Water Quality Administration were transferred to EPA which was established in accordance with Reorganization Plan 3 for the purpose of rationally and systematically organizing the Federal Government's environmentally related activities.

Within EPA the Federal water pollution control program was assigned to the Water Quality Office, now the Office of Water Programs. In April 1971 the research activities of the Office of Water Programs were transferred to EPA's Office of the Assistant Administrator for Research and Monitoring.

EPA's water pollution research program is carried out (1) through work in its own laboratories and associated field sites (in-house research) and (2) through grants and contracts for research, development, and demonstration projects (extramural research). The following table shows the amounts appropriated for extramural and in-house research during fiscal years 1956-72.

Fiscal year	Extramural research		In-house research	Total
	Section 5	Section 6		
1956	$ -	$ -	$ 443,219	$ 443,219
1957	-	-	440,100	440,100
1958	331,000	-	730,000	1,061,000
1959	319,500	-	830,500	1,150,000
1960	62,900	-	941,400	1,004,300
1961	100,000	-	1,551,300	1,651,300
1962	3,375,000	-	2,283,000	5,658,000
1963	4,505,000	-	2,535,000	7,040,000
1964	5,454,000	-	3,168,000	8,622,000
1965	6,904,000	-	3,801,000	10,705,000
1966	8,510,000	20,000,000	6,273,056	34,783,056
1967	11,119,000	20,000,000	8,135,000	39,254,000
1968	13,533,000	28,000,000	9,881,695	51,414,695
1969	13,504,000	19,968,000	10,139,846	43,611,846
1970	13,822,000	11,228,000	12,209,950	37,259,950
1971	19,802,000	16,661,000	19,455,000	55,918,000
1972	24,000,000	10,701,000	15,000,000	49,701,000
Total	$125,341,400	$126,558,000	$97,818,066	$349,717,466

CHAPTER 2

MANY DEMONSTRATION GRANTS AWARDED FOR CONVENTIONAL WASTE TREATMENT PROJECTS

The Federal Water Pollution Control Act authorizes grants for demonstrating new or improved methods of controlling and preventing water pollution, including methods of treating industrial wastes which have industrywide application.

In May 1966 the Chief, Basin and Applied Sciences Program, Federal Water Pollution Control Administration, described before the Subcommittee on Air and Water Pollution, Senate Committee on Public Works, the need for the demonstration of new treatment methods, as follows.

> "*** Research and development generally goes through a series of steps ranging from exploratory studies through laboratory research, pilot plants and field evaluation. In the past our efforts have been mainly in laboratory research and there has been a recognized deficiency in the application of research findings. The application of research findings requires that someone undertake the construction and operation of a new type facility which is often very expensive and which is associated with a greater risk of failure than with processes which are already proven in practice. *** It may very well be in the best public interest for the Federal Government to design, construct, and operate full-scale facilities to develop and demonstrate new ways of pollution control ***." (Underscoring supplied.)

Demonstration grants were first authorized by the Water Quality Act of 1965 (75 Stat. 903) which amended the Federal Water Pollution Control Act. From the beginning of the demonstration grant program in fiscal year 1966 through fiscal year 1972, the Congress appropriated about $126 million for the demonstration of new or improved methods of controlling water pollution.

The demonstration grants have contributed to solving problems relating to the causes, control, and prevention of water pollution. Some projects have demonstrated new treatment methods, and others show promise for improving conventional waste treatment practices. Our review showed, however, that many demonstration grants had been awarded for the construction and operation of full-scale conventional waste treatment projects which did not demonstrate new or improved waste treatment processes but rather modified or extended conventional processes.

EPA has not established specific criteria or guidelines for determining the extent to which the Federal Government should share the cost of constructing, operating, and maintaining full-scale projects for which only a part of the costs are related to demonstrating new or improved water pollution control methods.

Our review included 39 full-scale demonstration projects for which Federal grants totaling $13.8 million had been awarded. Of the 39 projects, three had been completed as of June 30, 1971. The following sections of this chapter discuss the details of our findings. In addition, appendix I contains detailed information on three demonstration grants awarded for projects using conventional waste treatment processes.

MANY PROJECTS CONCERNED WITH REFINING EXISTING WASTE TREATMENT METHODS

In May 1971 we stated in testimony before the House Public Works Committee that a significant amount of demonstration grant funds had been used for projects which had not demonstrated new methods of waste treatment. In June 1971 the EPA Acting Director, Research Programming, testified before the Committee and commented on our testimony, as follows.

> "Indeed. Again, I would say that is a true statement. As I said earlier, I really cannot think of a single new scientific principle that we have discovered in the last 10 or 12 years. *** The fact of the matter is we are applying and demonstrating scientific principles which have been discovered

and been in existence for many years. Many of our demonstration projects are aimed deliberately at bringing to engineering fruition for the first time a conglomeration of scientific and engineering principles to demonstrate what can be done and to establish what amounts almost to a certification of the performance, the reliability and the cost of this particular treatment concept to a particular kind of waste in a real life situation, so, frankly, yes, many of our demonstrations are that kind, and we think they have paid off."

We found that many of the grants had been awarded for projects which demonstrated technology that had been in widespread use for many years. EPA officials told us that these projects applied conventional technology to wastes that had not previously been treated by such technology.

For example, our review included 21 grants awarded to food-processing plants and eight grants awarded to pulp and paper plants for the construction of full-sized treatment plants. Of the 29 grants, 13 grants totaling $4 million were awarded for the construction and demonstration of activated sludge treatment, trickling filters, and aerated lagoons. According to EPA publications, activated sludge, trickling filter, and aerated lagoon treatment systems are classified as conventional secondary waste treatment systems.[1]

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[1]Conventional secondary treatment consists of some form of biological oxidation. In the trickling filter process, settled effluent is sprayed over a bed of rocks or other media that accumulates microorganisms on its surface. The microorganisms use the organic materials in the wastewater for food and thus purify the water. In the activated sludge process air is bubbled through the wastewater causing growth of organisms which use organics in the wastewater for food. A final settler is used for removing solids in both methods. Another secondary treatment method, less effective than the others, is the use of lagoons (oxidation ponds). There is considerable variation in the design and operation of these lagoons, and they can be mechanically aerated.

The 13 projects refined conventional methods and/or provided detailed cost, design, and operational data for conventional systems.

EPA headquarters officials agreed that some projects (including the three examples discussed in app. I) demonstrated conventional waste treatment processes. The officials stated that, although the processes had been widely used for various kinds of wastes, some industries, such as the food-processing industries, had not used the available processes to treat their wastes. They pointed out that in the past the food-processing industries commonly did not treat their wastes but rather disposed of them by spray irrigation. They pointed out also that, to convince these industries to treat their wastes, it was necessary for EPA to demonstrate that waste treatment processes were available and that EPA, in funding such projects, was extending the use of conventional technology to develop new applications.

Although the primary purpose of the grant program was demonstrating new or improved methods of controlling water pollution, EPA had not defined "new or improved" or provided its personnel charged with reviewing and evaluating grant applications with adequate guidance as to what features or characteristics of a proposal should be considered in determining eligibility for grant support.

EPA headquarters officials stated that guidance had been provided to the reviewers by state-of-the-art documents. They stated also that they relied primarily on the experience and judgment of their staff to determine what was new or improved.

Two EPA research program chiefs, who were responsible for reviewing grant applications, told us that some of the demonstration grants awarded in the past had not demonstrated anything significantly new or improved. They said that, although administration of the program had improved, some recent grants had been awarded for conventional waste treatment systems. They also said that they had submitted highly unfavorable review comments on some applications for demonstration grants, only to have the applications approved and grants awarded by EPA headquarters.

EPA had not established specific criteria for determining whether proposed demonstration projects had potential industrywide application. Because of their conventional nature, many of the demonstration grant projects we reviewed had industrywide applicability. For two projects, however, the potential for industrywide application was questionable.

The technical reviewer for one project stated that:

> "It is very doubtful that this grant, if awarded, would have much impact upon industrial pollution problems, especially in the bakery industry. First of all, most of the bakeries are located in municipalities where it is nearly always advantageous (both in economic and efficiency) to use the municipal system. Secondly, the relative pollution problems from this industry are rather minor as compared to other types of food processing."

The grantee's report on the second project which demonstrated the treatment of wastes from a steel company's cold rolling mill stated that, because no two cold rolling mills were operated identically, the conclusions reached with regard to the treatment of this cold rolling mill's wastes could not necessarily be extended to all cold rolling mills.

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The Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500), enacted on October 18, 1972, continue to authorize grants for projects which demonstrate new or improved methods of waste treatment. The Senate Public Works Committee report on the Senate version of the legislation stated that:

> "Throughout the bill there is great emphasis on control technology, process change, and other alternatives to ultimately eliminate the discharge of pollutants into the Nation's waters. To achieve compliance with such objectives it will be necessary to undertake an extensive program of demonstration projects in order to rapidly expand technological responses available to meet the national objective."

In view of (1) the need for developing and demonstrating treatment technology for controlling and preventing water pollution and (2) the intent of recently enacted legislation, we believe that EPA should place greater emphasis on funding projects that demonstrate new or improved methods of waste treatment.

NEED FOR CRITERIA TO DETERMINE EXTENT OF FEDERAL PARTICIPATION IN DEMONSTRATION PROJECTS

We found that a considerable portion of EPA demonstration grant funds were used for constructing conventional waste treatment facilities and maintaining such facilities.

The Federal Water Pollution Control Act, as amended, provides that the Administrator may award demonstration grants to States and municipal agencies in an amount up to 75 percent of the estimated reasonable cost of the projects. The act limits grants to individuals for projects which will prevent industrial pollution to the lesser of $1 million or 70 percent of the cost of the project.

Although the EPA Grant and Contract Processing System Handbook listed general factors to be considered in determining the amount of Federal participation in demonstration projects, the Handbook did not set forth any specific criteria for adequately assessing these factors.

EPA demonstration grant funds were used for (1) construction (engineering, materials, construction services, and equipment), (2) operation and maintenance (salaries, utilities, repairs, and supplies), and (3) research (post-construction studies and reports).

At our request EPA prepared the following chart showing allocation of demonstration grant funds awarded to food-processing plants for the 21 full-scale projects included in our review.

		EPA grant	
	Total eligible project costs	Amount	Percent of total eligible project costs
Construction	$ 9,145,744	$3,590,613	39
Operation and maintenance	2,589,884	1,065,800	41
Research	1,568,635	1,036,234	66
Total	$13,304,263	$5,692,647	43

Because a substantial part (over 80 percent) of the demonstration grant funds were used for construction and operation and maintenance, we believe that EPA needs to establish specific criteria for determining the Federal share of such costs.

For some projects the amount of grant funds used for construction and operation and maintenance appeared to be excessive in comparison to the funds used for research. For example, a demonstration grant of $375,000 was awarded for a waste treatment project which cost $535,000 and which used an activated sludge treatment process--generally considered to be a conventional secondary treatment process--involving commonly used equipment. About 92 percent of the grant funds were used for construction and operation and maintenance; the 73 percent which was used for construction included the costs of purchasing five aerators, a clarifier, two sludge pumps, and a sludge thickener. This equipment was available from a number of suppliers and was not new or unique.

In another case the grantee's final report on the project indicated that the amount of grant funds awarded for the full-scale project substantially exceeded the grantee's costs to carry out the research aspects of the project. The total eligible cost of the project was $690,000. The grantee's report said that $166,726 would be needed for construction and $20,950 for operation and maintenance to carry out the research aspects of the project. According to EPA, grant funds of $412,930 were to be used for construction of this project and grant funds of $50,827 for operation and maintenance.

Two EPA research program chiefs told us that they had received no guidance on the Federal share of costs that should be allowed for full-scale demonstration projects. One program chief said that he usually approved Federal participation of 10 to 40 percent of the cost of constructing the project, 30 to 60 percent of the operation and maintenance costs, and 70 percent of the research costs. Both officials told us that EPA headquarters sometimes approved grants in amounts higher than they had recommended.

EPA headquarters officials told us that the Federal share of the project cost was subject to negotiation with

the grantee. One official said that, in order to conduct research on industrial wastes, it was necessary to offer industrial officials enough of an incentive to take on the additional work involved in the research aspects of the projects.

We recognize that the research aspects of demonstration projects require effort and expense beyond that needed to meet the grantees' waste treatment needs. However, grant funds cover such additional expenses.

In many cases the grant applicants were required by regulation or enforcement action to install waste treatment facilities. Of the 39 grantees included in our review, 22 were required to install the facilities. Therefore it would seem that EPA should fund those costs related to research and minimize its share of the cost of constructing those parts of a project which involve conventional treatment processes. A considerable amount of grant funds, however, were used for the construction and operation of projects using conventional treatment processes.

For example, one company, under a court order to reduce its waste discharges, had constructed and operated a pilot-scale activated sludge system which is generally classified as a conventional waste treatment system. In April 1969 the company requested a demonstration grant from EPA for the engineering design, construction, and operation of the full-scale activated sludge treatment plant. In October 1969 the company received an EPA grant of $210,500, of which $204,400 was to be applied toward construction and operation and maintenance.

CONCLUSIONS

Although the primary purpose of the grant program is the demonstration of new and improved methods of controlling water pollution, EPA had not provided adequate guidance to its personnel charged with reviewing and evaluating applications as to what features or characteristics of a proposal should or should not be considered new or improved. Our review showed that many grants were awarded for the construction and operation of full-scale waste treatment projects

which did not demonstrate new or improved methods of controlling water pollution but which involved modifications or extensions of conventional treatment processes.

EPA has not established specific criteria or guidelines for determining the Federal share of the cost of constructing, operating, and maintaining full-scale demonstration projects for which only part of the costs are related to demonstrating new or improved water pollution control methods.

RECOMMENDATIONS

We recommend that the Administrator, EPA:

--Place greater emphasis on funding projects that demonstrate new or improved methods of waste treatment.

--Provide more specific guidance on the factors that should be considered in determining whether a proposed treatment process is new or improved and has industrywide application.

--Establish specific criteria for determining the Federal share of the cost of full-scale projects for which only a part of the costs relate to demonstrating new or improved water pollution control technology.

- - - -

In commenting on our draft report in a letter dated August 24, 1972, (see app. I), EPA stated that:

"The report has served as an extremely useful tool for our managers in their continuing efforts to refine and improve the [water pollution research, development, and demonstration] programs."

* * * * *

"In our judgment, conventional methods have a place in demonstration programs if, as a practical matter, they give promise of changing an industry's approach to the treatment of wastes.

In any event, much greater emphasis is being and will continue to be given to adapting and demonstrating new methods of waste treatment that go beyond the conventional systems. Our guidelines for project review and approval will reflect this emphasis as will criteria for the extent of participation in the construction and operational maintenance costs of the projects."

CHAPTER 3

ADMINISTRATION OF RESEARCH GRANTS AND CONTRACTS

For fiscal years 1956 through 1972, the Congress appropriated about $252 million for EPA's grants and contracts for research, development, and demonstration projects. As of June 30, 1971, EPA had about 900 active grant and contract projects. EPA's Grant and Contract Processing System manual contains EPA's procedures and regulations for administering the extramural research program. The manual states that the:

> "*** system is designed to allow efficient awarding of grants and contracts; fulfill external and internal management and reporting requirements on all active projects; reduce paper shuffling; and produce, centrally, information on grant, contract, and in-house project decision-making and processing."

We reviewed EPA's procedures and practices for administering research grants and contracts. Our review, which included 104 of the 900 active projects, showed that in many cases:

--Approval of applications had been delayed for both new projects and extensions for ongoing projects.

--Monitoring of ongoing research projects had been inadequate.

--Grantees had not submitted project reports on a timely basis and EPA had not promptly disseminated them to potential users.

In January 1971, while our review was in progress, the Administrator, EPA, established the Grants Procedural Task Group to review EPA's procedures for administering all grant activities, including procedures for administering water pollution control research, development, and demonstration grants. The task group completed its review in March 1971 and found many of the same problems that we identified during our review.

DELAYS IN APPROVING APPLICATIONS FOR RESEARCH GRANTS AND CONTRACTS

In many cases EPA's review and approval of grant and contract applications took considerable time and caused delays in approving applications for both new projects and extensions of ongoing projects. As a result, applicants were uncertain as to whether their proposed research projects would be approved, and the progress of ongoing projects was hindered because grantees had difficulties in retaining qualified staff.

In evaluating grant and contract proposals, EPA conducted three types of reviews: (1) a program relevance review, (2) a regional and policy review, and (3) if the first two reviews were favorable, a scientific and technical merit review.

The program relevance review was made to determine whether EPA had authority and funds to support the proposal and whether the proposal was directed toward solving a pollution problem of high, medium, or low importance.

The cognizant EPA regional office made the regional and policy review to ascertain whether a proposal should receive special consideration for expeditious handling, should be rejected because of a conflict with regional policies, or should be deferred because of a conflict with other ongoing nonresearch activities within the region.

EPA conducted the program relevance review and the regional and policy review simultaneously. According to EPA's procedures these reviews were to be made within 10 working days following receipt of the proposal at headquarters. These reviews did not require a detailed scientific or technical analysis of the proposal.

The scientific and technical merit review was a detailed analysis of a proposal carried out by members of the research staff at the various laboratories or by the technical staff at headquarters. EPA procedures did not require that this review be completed within a specific period of time. Because research grants were awarded for only 1 year at a time, grantees had to reapply annually for continued

financial support of those projects which required more than a year to complete.

In our review of the 104 projects, we identified 22 grants and contracts for which the applications for new projects had been under review by EPA for at least 6 months--in one case more than 18 months--before the applicants were notified of the acceptance of their proposals. With respect to applications for continued support of ongoing projects, we identified 23 grants for which delays of at least 1 month were incurred between the time grant support had ended and the time EPA notified the applicants that their projects would or would not continue to receive grant support. In one case the grantee was notified of continued support 8 months after the renewal date, and in another case the grantee was not informed that his grant had been terminated until 5-1/2 months after the renewal date.

The Grants Procedural Task Group, established to study EPA's grant operations, stated in its report that:

> "Both staff and applicants report cases of lost proposals. Program manager's offices were observed to be piled high with stacks of proposals awaiting action of one sort or another. Research grant applicants report waiting 6 to 19 months for decisions, and losing graduate students as a consequence. Delays of up to 6 months were reported to be not infrequent for approval of a program manager's recommendations by the *** [Commissioner]. In FY 1970, 526 research and 244 demonstration grant proposals were received and logged in. By March 1, 1971, eight months later, 143 research and 70 demonstration grant proposals were still pending final action."

The task group also noted that grantees frequently reported long delays in receiving approval for continued funding of ongoing projects, which resulted in loss of staff and in financial stress.

The task group attributed the delays to such causes as (1) the heavy workload of the in-house research staff who reviewed applications in addition to performing their

research duties and (2) the lack of deadlines for notifying applicants of the acceptance, rejection, or deferral of their proposals.

An EPA official told us that, in some cases, negotiations between EPA and the applicants concerning the scope of the proposed research work caused delays.

In December 1971 EPA issued revised procedures which established deadlines for reviewing applications and for notifying applicants of the acceptance, rejection, or deferral of their proposals.

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INADEQUATE MONITORING OF ONGOING RESEARCH PROJECTS

In many cases, progress reports required for ongoing research projects had not been submitted or had been submitted late and project officers had not visited project sites. When such monitoring techniques are not properly used, EPA has little assurance that research projects are being conducted in accordance with the objectives of the grants or contracts.

Prior to 1967 there was little surveillance over research grant and contract projects because EPA did not have project officers. Since 1968, however, project officers have been routinely assigned to monitor these projects.

Because of the large number of research grants and contracts and restrictions on hiring, EPA found it necessary to use some of its laboratory researchers as project officers. (See pp. 34 and 35.) The project officers' duties for administering grants and contracts included (1) providing technical merit and program relevance reviews for grant proposals, (2) reviewing bids, plans and specifications, and subcontracts, (3) reviewing quarterly progress reports, (4) reviewing and certifying quarterly vouchers, (5) periodically visiting project sites, (6) identifying deviations from approved project objectives, and (7) reviewing final report manuscripts.

Our review indicated that some EPA project officers had not received adequate guidance and training for carrying out their responsibilities. Several project officers told us that they were having trouble with certain accounting and administrative matters. At one laboratory a project officer said that he had been given no training or preparation for his duties as a project officer. One laboratory director told us that the monitoring of research projects could be improved by providing better instructions and orientation for new project officers.

EPA requires grantees and contractors to submit quarterly progress reports which are to contain brief descriptions of the work. Thus, the progress reports can assist project officers in identifying deviations from approved

objectives and can provide a basis for redirecting the work to accomplish the objectives.

We found that one or more of the required progress reports had not been submitted for 33 of the projects included in our review. Progress reports had not been submitted for eight of the 33 projects and progress reports had not been submitted for a period of at least 1 year for 12 of the projects. Also, progress reports for an additional 21 projects had been submitted late.

Although visits to project sites enable the project officers to evaluate the facilities available for research and the progress of the research, EPA's manual provides that, because research grants are awarded almost exclusively to universities for rather specialized laboratory investigations and exceed in number all other types of grants, project officers should contact such grantees only when absolutely necessary to prevent or correct major problems.

Our review of EPA project files for the 104 projects did not indicate that site visits had been made to 58 of the projects, including 13 of the 20 projects for which progress reports had not been submitted at all or had not been submitted for at least 1 year. In those cases where the files indicated that site visits had been made, the project officers generally did not prepare visit reports.

Several project officers told us that project site visits could help keep a grantee's or contractor's research efforts channeled toward the intent of the grant or contract and could provide the project officer with better knowledge of the status of a research project than correspondence alone could. They told us that in many cases visits to project sites were not made because program funds were not available to cover the travel costs.

PROJECT RESULTS NOT RECEIVED AND DISSEMINATED ON A TIMELY BASIS

In testimony before the House Public Works Committee in June 1971, EPA's Assistant Administrator for Research and Monitoring stated that the accomplishments of the water pollution research program should be weighed in terms of the availability of newly discovered scientific information and technology to prevent and control pollution. He added that because of the urgencies of environmental cleanup:

> "*** a variety of mechanisms have been put into motion to encourage and assure the application of research results. A fundamental background to these mechanisms has been a steadily intensifying application of enforcement and regulatory pressures-for it is only in such a context that rapid progress in adoption of pollution control innovations can be made."

If the results of water pollution control research projects are to be widely used, it is essential that EPA obtain timely final reports from grantees and contractors, review and evaluate the reports, and promptly disseminate information to potential users. However, EPA did not obtain timely reports on many completed research projects and, for projects where reports were obtained and evaluated, EPA did not promptly disseminate the results to potential users.

Project results not submitted on time

EPA's manual requires a grantee or contractor to submit a final report to the project officer within 90 days after completing a research project. The manual, however, does not provide the project officers with guidance on the procedures to follow when final reports are not submitted on time, although the project officers told us that they could withhold grant funds pending receipt of the reports. In November 1971 EPA issued regulations providing for the withholding of 10 percent of the grant funds (to a maximum of $10,000) until EPA was satisfied that all grant conditions and requirements, including the receipt and approval of the final report, had been met.

We identified 17 projects for which the final reports had not been submitted until at least 7 months after grant support had ended. We found that the project officers generally did not promptly contact the researchers to encourage them to submit final reports within 90 days of completion of the projects. In some cases, EPA withheld payment of part of the contractor's or grantee's final vouchers. In other instances, however, when EPA terminated its support of projects, funds were not withheld from the grantee or contractor and, consequently, the grantee or contractor had little incentive to submit a final report.

In one case EPA awarded grants totaling $83,049 for a research project from June 1966 through July 1969. In January 1970 EPA notified the grantee that his request for continued support of the project had not been approved. In March 1971, 14 months later, the project officer sent a letter to the grantee reminding him that a final report on the project was required. The grantee replied that he was not inclined to spend his time preparing a report. As of March 1972 the grantee had not submitted a final report, and grant funds had not been withheld pending submission of the final report. In October 1969 EPA awarded the grantee a grant of $20,580 for the conduct of a second project from October 1969 to September 1970. In March 1971 EPA approved additional grant support of $23,840 to September 1971, and in February 1972 EPA approved continued grant support of $27,158.

In this case the project officer did not (1) promptly contact the grantee to urge him to submit a final report or (2) withhold funds pending submission of the report.

In another case a grantee was awarded a grant of $16,089 to conduct a water pollution research project for 1 year. In February 1969 the grantee was awarded an additional grant of $7,538 to terminate the project by September 1969. The project officer told us that EPA had withheld 10 percent of the grant amount pending receipt of the final report. The project officer attempted to obtain the final report by writing to the grantee 11 months after the end of the grant period. The grantee finally submitted the final report to EPA in February 1972.

Although EPA withheld grant funds from the grantee in this case, we believe that the project officer should have promptly contacted the researcher to urge him to submit the final report.

In our opinion, EPA should establish procedures which (1) require project officers to promptly contact grantees and contractors and urge them to submit final reports and (2) provide for withholding financial support for new projects from researchers who have failed to submit reports on other EPA projects.

Delays in processing final reports

Project officers review and approve final grantee reports before submitting them to review coordinators in Washington, D.C., for final processing and publication. Because the final processing of reports generally involves finalizing the formats of the reports and preparing purchase orders for the printing of the reports, only a minimum amount of time should be required for such processing. We found, however, that there were significant delays in the final processing. We noted that four reports were delayed in final processing for at least 1 year before being published.

As of July 16, 1971, 50 final reports were in final processing. Of the 50 reports, 33 had been with the review coordinators for 3 months or more and two had been with the coordinators for at least 10 months.

We discussed EPA's processing procedures and the delays with several review coordinators. They told us that in the final processing they generally prepared covers, titles, and purchase orders for the printing of the reports. One coordinator said that he might make some editorial changes to the reports. The coordinators, however, stated that generally they did not change the content of the final reports.

One review coordinator told us that his primary responsibility was for the technical and policy aspects of research projects and that the processing of final reports was a low-priority job. Another review coordinator stated that delays were attributable to a lack of sufficient staff to efficiently handle the processing of final reports. A third review coordinator told us that the need to formulate a cover design and title was often a cause of delay. A fourth review coordinator, who at the time of our discussion had held one report for 3 months, told us that the report was not sent to the printer because it was typed double-spaced and EPA required that reports be typed single-spaced. Two of the review coordinators told us that final processing could be expedited if a central office handled the functions of preparing report covers and titles.

In a July 1971 memorandum on delays in processing final reports, the Acting Chief, Office of Planning and Resources, stated that:

"Neglect in processing final reports for printing is of grave concern. Grantees and contractors who submitted these manuscripts have repeatedly made inquiries as to why the reports are not printed and available, and they become quite disturbed over the delay involved. This sheds a bad light on our entire program in addition to the fact that producing these expeditiously is the only really usable evidence of our whole existence."

* * * * *

"The attitude seems to exist that the final reports are unimportant, and are to be handled after more important tasks are done. Our final reports are important, and must be given the attention they deserve. They are the end product of the vast amount of funds expended to support research projects."

In January 1972 EPA revised its procedures to provide that the Publications Branch (Water) process final reports. This revision, if properly implemented, should result in more expeditious processing.

CONCLUSIONS

The success of EPA's research program depends not only on technical competence but also on effective and efficient management. Our review of EPA's extramural grant and contract program indicated a need for EPA to improve its management and surveillance of the program.

During our review EPA made a number of changes in its regulations and procedures which, if properly implemented, should improve the administration of its extramural research program. We believe, however, that further changes are desirable; accordingly, we are making the following recommendations.

RECOMMENDATIONS

We recommend that the Administrator, EPA:

--Insure that all project officers are adequately trained to administer the extramural grants and contracts programs.

--Require project officers to promptly contact grantees and contractors to urge them to submit progress reports and final reports on a timely basis.

--Withhold financial support for new projects from applicants who, without justification, have not submitted the required final reports on completed research projects for which they previously received EPA financial support.

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In April and May 1972 we met with EPA's Deputy Assistant Administrator for Research and members of his staff to discuss the above matters. The EPA officials were in general agreement with our findings and recommendations.

CHAPTER 4

LABORATORY FACILITIES AND EQUIPMENT

Our review at four EPA laboratories showed that the laboratories were not fully staffed. Although the number of laboratories has increased in the past several years, emphasis on a strong extramural research program has increased. Because of a lack of sufficient staff to administer the grants and contracts program, laboratory research staff were required to spend much of their time administering the extramural program. As a result, EPA did not fully use its laboratory facilities or its research personnel for in-house research.

At the four laboratories, there were no formal procedures for identifying little-used or excess equipment. Usage records were not maintained, and equipment pools had not been established. An inspection of research equipment by us and EPA officials at the four laboratories disclosed that equipment which cost about $106,800 was excess to the laboratories' needs. In addition, at two of the laboratories, equipment which cost about $105,000 was identified as being underused and thus available for pooling or sharing.

LIMITED USE OF LABORATORY FACILITIES FOR IN-HOUSE RESEARCH

EPA considers the in-house research conducted at its laboratories to be highly productive and effective and to be the foundation of its overall research program. A May 5, 1969, report, prepared by EPA's water pollution research program staff, stated that the past success of EPA's research program stemmed from a sound in-house program and that "a large fraction of the pollution control technology to be demonstrated a few years hence must emerge from our own in-house research." The report pointed out that staffing limitations would appreciably slow work in specific program areas.

On June 22, 1971, EPA's Assistant Administrator for Research and Monitoring stated before the House Public Works Committee that "in-house research is highly productive and the most cost effective for moderately sophisticated research."

He stated that extramural research was more difficult to control in terms of cost and timeliness of completion.

Staffing

Before December 1965, there was only one water pollution control research laboratory, the Robert A. Taft Water Research Center in Cincinnati, Ohio. During the period December 1965 to July 1967, water pollution control research laboratories were constructed in Athens, Georgia; Ada, Oklahoma; Corvallis, Oregon; College, Alaska; and Duluth, Minnesota. (EPA also operates two temporary laboratories at Edison, New Jersey, and Narragansett, Rhode Island.) About $22 million was spent to construct and equip the laboratories.

The five additional permanent laboratories provided space for 625 research personnel. Authorized positions for the water pollution control research program increased from 498 in fiscal year 1966 to 548 in fiscal year 1968, while permanent employment increased from 201 to 478 during the same period. From fiscal year 1968 until December 1971, staffing levels remained relatively constant due to Government-wide personnel limitations.

The following table shows the personnel capacity and the staffing as of December 1971 for three of the four laboratories[1] included in our review.

Laboratory	Personnel capacity	Staff at December 1971	Percent of capacity
Pacific Northwest Water Laboratory	150	102	68
Alaska Water Laboratory	60	34	57
National Water Quality Laboratory	130	82	63
	340	218	64

[1]We were unable to develop data for the Robert A. Taft Water Research Center because it houses occupants in addition to water pollution control personnel.

The laboratories were staffed to their authorized personnel ceilings. Officials of the four laboratories told us, however, that they could effectively use additional research staff--both professional researchers and supporting technicians and research assistants--without any significant increase in laboratory equipment.

Use of research staff

The primary duties of laboratory researchers are to perform in-house research and provide technical assistance to other EPA personnel, State and local water pollution control agencies, and industrial personnel. Technical assistance includes scientific analyses of water quality data to support Federal enforcement actions and studies of specific pollution problems at the request of State and local water pollution control agencies.

We found, however, that in a number of cases researchers spent considerable time administering the extramural research grant and contract program. The administrative duties included technical and program relevance reviews of grant and contract proposals, monitoring on-going projects, reviewing and evaluating final reports, and reviewing and approving bids, plans, specifications, and subcontracts.

The researchers' time spent at duties other than in-house research varied between laboratories and between individuals, but overall it was considerable. Laboratory officials estimated that in 1971 their staffs' time was spent as follows.

	Percent of staffs' time		
Laboratory	In-house research	Technical assistance	Grant and contract administration
Pacific Northwest Water Laboratory	38	21	41
Alaska Water Laboratory	65	22	13
National Water Quality Laboratory	94	0	6
Robert A. Taft Water Research Center	48	18	34

The above estimates are laboratorywide averages. Research staff working in certain program areas devoted a higher percentage of their time to duties other than in-house research. For example, at the Pacific Northwest Water Laboratory, 12 researchers assigned to the National Waste Treatment Research Program spent 15 percent of their time on in-house research, 65 percent on grant and contract administration, and 20 percent on providing technical assistance.

An EPA May 1969 report stated that, because a large part of the pollution control technology to be demonstrated a few years hence must emerge from in-house research, the continued diversion of staff from research duties to the duties of administering extramural projects would unquestionably diminish the base for future demonstration projects. The report stated also that some research staff had limited competence for administering extramural projects. The report concluded that the use of research staff for such duties would have an impact on researchers' morale and, because of limited in-house research opportunities, would affect recruiting efforts.

In testifying before the House Public Works Committee in June 1971, EPA's Assistant Administrator for Research and Monitoring explained the reasons for the use of in-house research personnel to administer extramural projects as follows.

> "*** in order to move forward at the greatest rate and in accord with new Congressional authorization to conduct extramural projects through grants and contracts, overall emphasis shifted to a strong extramural effort guided and directed by a relatively limited in-house force located both at headquarters and at our various laboratories."

EPA's Acting Director, Research Programming, stated that in 1967 EPA began using its laboratory researchers to administer grants and contracts

> "*** with the expectation that we would be bringing back into balance in future years the effort of our in-house laboratory program as compared with our extramural program."

In 1971, however, EPA researchers were still devoting a considerable amount of time to administering grants and contracts.

NEED FOR IMPROVED MANAGEMENT OF LABORATORY EQUIPMENT

Subpart 101-25.109 of the Federal Property Manangement Regulations provides, in part, that:

> "Periodic tours shall be conducted of laboratory facilities to identify idle and unneeded laboratory and research equipment. After each inspection tour, equipment which has been identified as idle and unneeded shall be reassigned or released for further utilization."
>
> * * * * *
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> "Laboratory and research equipment pools shall be established when the circumstances indicate such pools are appropriate so that such equipment can be made available to activities and individuals whose average usage does not warrant the assignment of such equipment on a permanent basis."
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> * * * * *
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> "Although specific pieces of laboratory equipment may not be available for assignment to equipment pools, they may be available for sharing or loan."

Formal procedures requiring periodic tours (or walk-throughs) to identify unneeded or little-used equipment did not exist at the four EPA laboratories included in our review.

During our review we conducted walk-throughs of the four laboratories with EPA teams of top management and senior scientific personnel representing each of the equipment user groups at the laboratories. The team inspected research equipment which cost about $1,707,000, or about 68 percent of the cost of all research equipment at these laboratories. Office and facilities equipment such as calculators, desks, and drill presses were not included.

The teams identified equipment which cost about $106,800 (about 6 percent of the cost of all equipment inspected) as excess to users' needs. A small amount of this equipment had been declared excess prior to the walk-throughs. The excess equipment included such items as microscopes, liquid level recorders, and pH meters. The results of the walk-throughs are summarized in the following table.

Laboratory	Total research equipment	Total evaluated	Percent evaluated	Excess equipment	
				Total	Percent of amount evaluated
Robert A. Taft Water Research Center	$ 510,000	$ 510,000	100	$ 23,000	5
National Water Quality Laboratory	674,000	379,000	56	22,800	6
Alaska Water Laboratory	453,000	340,000	75	41,000	12
Pacific Northwest Water Laboratory	881,000	478,000	54	20,000	4
Total	$2,518,000	$1,707,000	68	$106,800	6

Subsequent to the walk-throughs, officials of these laboratories advised us that they would release all unneeded equipment so that others could use it. They generally agreed that the walk-through was a useful management tool which could lead to greater use of equipment and more intelligent review and evaluation of proposed equipment purchases.

Officials at one of the laboratories established a committee of top management and senior scientific personnel to conduct annual walk-throughs. In addition, they told us that periodic informal inspections would be made to identify equipment that might become excess during periods between the annual walk-throughs. Officials of another laboratory told us that they would establish a similar committee and a date for the annual walk-through.

In addition to identifying the excess equipment, the teams identified equipment at the Pacific Northwest Water Laboratory and the National Water Quality Laboratory which

cost about $105,000 (12 percent of the value of equipment inspected at the two laboratories) as being underused and thus available for pooling or sharing. Although some informal sharing of equipment had occurred, no formal policy or procedures for pooling or sharing had been established.

Officials at the Alaska Water Laboratory told us that they had a small staff and limited space and that there was no need for pooling because the researchers were aware of the location and availability of the research equipment. The Director of the Robert A. Taft Water Research Center was opposed to formal pooling as a recommended procedure because of the limited size of the staff and inadequate space for a pool. He said that he would consider establishing an equipment pool if the in-house research program was appreciably enlarged.

Officials of the Pacific and National Laboratories informed us that they were in favor of establishing centralized pools for some equipment available for sharing, but not all such equipment, because of a lack of manpower and storage space. At the Pacific Northwest Water Laboratory, an official said that problems could result if the equipment was not immediately available and in good operating condition. Officials at the Laboratory told us, however, that they planned to centrally pool such items as microscopes and cameras and to maintain usage records on the equipment and that the location and availability for sharing of large or delicate equipment would be made known to potential users at the Laboratory. At the National Water Quality Laboratory, a committee was appointed to determine the equipment to be pooled.

The officials at the Pacific and National Laboratories told us that they planned to list all equipment available for sharing and include location and availability. They said that, even though some sharing already existed, the walk-through procedure would aid in making greater use of equipment and that the lists could be valuable aids in making decisions on future equipment purchases. The officials planned to review and update the lists of equipment available for sharing during their scheduled walk-throughs.

CONCLUSIONS

At the time it was constructing several new research laboratories, EPA began emphasizing its extramural grant and contract program. Because of Government-wide personnel limitations, EPA was not able to fully staff its laboratories and did not have sufficient staff to administer the extramural program. Thus, the research staff had to devote considerable time to administering the grants and contracts. As a result, neither the laboratories nor the research staff had been fully used for in-house research.

EPA sources have stated that EPA's in-house research is highly productive and effective and is the foundation of its overall research program. We believe, therefore, that there is a need for EPA to place greater emphasis on having laboratory researchers spend more time on their primary functions of in-house research and technical assistance.

Also, EPA officials should direct their attention to the more efficient management and use of laboratory equipment. At the four laboratories included in our review, there were no formal procedures for identifying little-used and excess equipment or for pooling or sharing equipment. We believe that EPA should survey the use of research equipment at its other water research laboratories.

RECOMMENDATIONS

We recommend that the Administrator, EPA:

--Require that a study be made at the EPA laboratories not included in our review to identify equipment that may be underused or excess to the laboratories' needs.

--Establish formal procedures requiring (1) systematic identification of excess and underused laboratory equipment and (2) more pooling or sharing of equipment.

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In commenting on our draft report in a letter dated August 24, 1972 (see app. II), EPA stated that:

"With the present staffing constraints throughout the Agency, we have had to seek a compromise in the utilization of staff so that an acceptable balance between in-house and extramural research can be achieved.

"This arrangement is admittedly far from optimum and when the staffing picture changes, the duties of the research staff will be reviewed and re-focused if at all possible. We will implement your proposal for a study, and the development of a formal procedure for identification, reuse or excessing of underutilized laboratory equipment."

EXAMPLES OF DEMONSTRATION GRANTS AWARDED FOR PROJECTS USING CONVENTIONAL WASTE TREATMENT PROCESSES

EXAMPLE I

In 1967 a cannery's waste treatment system consisted of a screening plant, an aeration pond which contained two 30-horsepower aerators, and a final clarifier. State tests indicated that the system was not effectively treating the cannery wastes. The State Water Pollution Control Commission requested the cannery to upgrade its treatment facility to meet the State's requirements of 90-percent removal of the organic content of the waste and removal of suspended solids from the waste stream.

The cannery applied to EPA for a research and demonstration grant to develop a treatment system which would remove 90 percent of the organic content of the waste. Three aeration methods of treatment were proposed for study: (1) aeration of the waste without removal of sludge and without sludge recycle, (2) aeration with removal of sludge and recycle, and (3) aeration with removal of sludge before sludge recycle.

The cannery's proposal included improvements to the existing aeration basin; an additional, larger basin equipped with four 60-horsepower surface aerators and an 150-horsepower aerator; an additional, larger clarifier; two sludge pumps; a sludge thickener; and a laboratory building and equipment.

The grantee's proposal received several scientific and technical merit reviews by EPA. One of the reviewers stated that:

> "The information to be developed by this project is not significantly different from research and studies conducted in the past by universities and in-house projects but the refinement of operational data and supplementary nutrient requirements may be of value."

APPENDIX I

The reviewer pointed out that the grantee's request for financial aid seemed high and he recommended "not more than 50% participation by the Federal Government."

Another reviewer stated that he found no strength to the technical merits of the project, that the project was not unique, and that the probability of success was insured.

In August 1967 EPA awarded the cannery a demonstration grant for $374,669, or 70 percent of the estimated eligible project cost of $535,242. EPA's research and development office, in recommending approval of the grant, stated that the project would provide for (1) an evaluation of the effectiveness and economy of various operating procedures for use in reducing pollution and (2) information which would have applicability to similar food-canning wastes.

The grant funds were to be used as follows.

	Amount	Percent
Construction	$275,339	73
Operation and maintenance	71,330	19
Research	28,000	8
	$374,669	100

Our examination of the construction items and discussions with a major equipment supplier indicated that this project involved conventional construction. The equipment used was available from a number of suppliers and was not new or unique. As for the treatment process, the final project report stated that:

> "Aeration of wastes for their treatment is not a new concept but has been tried quite extensively on pulp and paper waste streams and somewhat in the fruit and vegetable processing industry."

In summary, this project refined a conventional treatment process to treat the grantee's wastes and provided detailed cost, design, and operational data.

EXAMPLE 2

A company which had applied for a demonstration grant was discharging its wastes into the sewers of a metropolitan sanitary district. These wastes were heavily charged with hexane solubles (fats, oils, and greases), an undesirable discharge because of its tendency to block sewer lines and its interference with the district's treatment processes. The company was under a State court order to comply with the district's requirement to reduce the waste discharge to a maximum of 100 parts per million of hexane solubles by January 1971.

In April 1969, when the company applied for a demonstration grant, it had completed preliminary studies and had a pilot plant in operation which used secondary biological treatment. The application stated that the company's consulting engineer had tested many types of treatment and had recommended that the company use secondary biological treatment.

EPA approved the application and awarded a grant in October 1969. The grant funds were to be used as follows.

	Amount	Percent
Construction	$164,500	78
Operation and maintenance	40,000	19
Research	6,000	3
	$210,500	100

This project was to develop and demonstrate a secondary biological treatment process to reduce the final effluent from the grantee's plant to less than 100 parts per million of hexane soluble materials. Work under the grant was to include (1) the development of a secondary treatment biological process using the existing pilot plant, (2) demonstration and evaluation of a full-scale treatment system, and (3) determination of the effluent improvement obtainable by using a tertiary treatment process to further treat the effluent of the pilot plant or full-scale plant.

At the time of our fieldwork, construction of the full-scale treatment plant had not begun.

In summary, this treatment facility was designed to meet regulatory requirements using a conventional secondary treatment process that did not appear to be new or improved.

EXAMPLE 3

In August 1969 EPA was contacted about the possibility of awarding a demonstration grant for a bakery's treatment facility. An EPA official remarked that the bakery's treatment facility was likely to be built with or without a grant.

The bakery submitted a proposal dated October 1969 to EPA for a demonstration grant. The applicant's plans showed that it intended to dispose of the effluent from the bakery by discharging it into the groundwater. The bakery's treatment plant was designed to meet the standards set by the county regulatory authority on wastewater discharged into the groundwater. An EPA laboratory official who reviewed the proposal commented that:

> "Activated sludge treatment of bakery waste as proposed, would not qualify as either a new or improved treatment process ***."
>
> * * * * *
>
> "It is very doubtful that this grant, if awarded, would have much impact upon industrial pollution problems, especially in the bakery industry. First of all, most of the bakeries are located in municipalities where it is nearly always advantageous (both in economic and efficiency) to use the municipal system. Secondly, the relative pollution problems from this industry are rather minor as compared to other types of food processing."
>
> * * * * *
>
> "In view of the above, it is recommended that the application be considered but with very little

(less than 20 percent) participation in the construction costs. This would result in funding at a level of $50,000 or less."

EPA requested the bakery to rework and clarify certain aspects of the proposal. In February 1970 the bakery submitted a revised application. The grantee also sent a copy of a letter from a wholesale baker which stated that:

"I have inquired into the question of waste water treatment facilities in relation to bakeries in *** [my metropolitan] area and cannot find anybody who is doing anything special about it. All of the bakeries that I am familiar with are connected to large municipal treatment facilities."

An EPA headquarters reviewer who reviewed the revised application recommended approval and award of a grant of $129,729. The reviewer reported that "The project will provide documentation on secondary waste treatment for the bakery industry - current information is very scanty."

The laboratory official reviewed the revised application and commented that his remarks on the initial application were still valid. He also said that the revised proposal was confusing as to the type of facility that was to be built and how the facility was to be operated.

In June 1970 EPA awarded a grant of $129,729 to the bakery for a full-scale treatment project. The grant funds were to be used as follows.

	Amount	Percent
Construction	$ 93,372	72
Operation and maintenance	11,524	9
Research	24,833	19
	$129,729	100

In recommending approval of the project, EPA headquarters officials stated that the benefits to be obtained from the project included:

APPENDIX I

1. Documentation of a secondary waste treatment system for the baking industry.

2. An evaluation of a fat-oil emulsion-breaking system.

3. An evaluation of the adaptability of the activated sludge process to sweet-goods baking wastes.

4. Establishment of operating parameters for optimizing the activated sludge process.

In June 1970 the grantee received a bid proposal from a company for construction of the waste treatment facility. The construction company guaranteed that the effluent from the treatment facility would meet all requirements set forth in the grantee's specifications. The specifications, prepared by the grantee's engineering firm, stated that the treatment plant effluent would meet all standards of the county regulatory authority.

In summary, this treatment facility was designed to meet specific regulatory requirements; there were indications that it would have been built without Federal grant funds. The treatment process does not appear to be new or improved, and there is a question as to the need for a demonstration project for the baking industry because (1) most bakery wastes are treated in municipal treatment facilities and (2) the pollution problems of the baking industry have been described as relatively minor compared to the problems of other food-processing industries.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C. 20460

24 AUG 1972

Mr. Edward Densmore, Jr.
Assistant Director
Resources and Economic Development
Division
General Accounting Office
Room 1689, Parklawn Building
Rockville, Maryland 20852

Dear Mr. Densmore:

We have reviewed your draft report to Congress, "Improvements Needed in the Administration at the Water Pollution Research, Development and Demonstration Programs." The report has served as an extremely useful tool for our managers in their continuing efforts to refine and improve the programs.

Our Demonstration Grant Program has been balanced between support of advanced systems and support of industry-oriented modifications of conventional waste treatment methods. The composition of this balance, and the degree of modification in the latter group have been discussed at length with your auditors. The result is an honest difference of opinion on cost/benefit vis-a-vis legislative intent. In our judgment, conventional methods have a place in demonstration programs if, as a practical matter, they give promise of changing an industry's approach to the treatment of wastes. In any event, much greater emphasis is being and will continue to be given to adapting and demonstrating new methods of waste treatment that go beyond the conventional systems. Our guidelines for project review and approval will reflect this emphasis as will criteria for the extent of participation in the construction and operational maintenance costs of the projects.

In your review of laboratory facilities and equipment, you highlighted the amount of time that our research personnel spend administering extramural research grants and contracts. With the present staffing constraints throughout the Agency, we have had to seek a compromise in the utilization of staff so that an acceptable balance between in-house and extramural research can be achieved.

This arrangement is admittedly far from optimum and when the staffing picture changes, the duties of the research staff will be reviewed and refocused if at all possible. We will implement your proposal for a study, and the development of a formal procedure for identification, reuse or excessing of underutilized laboratory equipment.

We appreciated the opportunity to review your report.

Sincerely yours,

Thomas E. Carroll
Assistant Administrator
for Planning and Management

APPENDIX III

PRINCIPAL OFFICIALS

OF THE ENVIRONMENTAL PROTECTION AGENCY

AND THE DEPARTMENT OF THE INTERIOR

RESPONSIBLE FOR THE ADMINISTRATION OF ACTIVITIES

DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
ENVIRONMENTAL PROTECTION AGENCY (note a)		
ADMINISTRATOR:		
William D. Ruckleshaus	Dec. 1970	Present
ASSISTANT ADMINISTRATOR FOR RESEARCH AND MONITORING:		
Stanley M. Greenfield	Feb. 1971	Present
DEPARTMENT OF THE INTERIOR		
SECRETARY OF THE INTERIOR:		
Walter J. Hickel	Feb. 1969	Nov. 1970
Stewart L. Udall	Jan. 1961	Jan. 1969

[a]Became effective on December 2, 1970, in accordance with Reorganization Plan 3 of 1970.